



STUDY OF ROLLING BARRIER SYSTEM

Nikhil P. Dani¹, Kunal K. Shirsath², Siddheshwari S. Langote³

^{1,2,3}Students:- Department of Civil Engineering,

Guru Gobind Singh College of Engineering Reserch Centre, Nashik, Maharashtra (India)

ABSTRACT

In 2015, there were 63,805 traffic accidents over on the Maharashtra, India, with 54.2 % composed of vehicles that crashed into longitudinal barriers. Such accidents can be drastically reduced if more safe barriers are installed for traffic safety. A small Korean manufacturing company invented a new concept longitudinal barrier, the Rolling Barrier (RB), which has continuous pipes covered with urethane rings. This study aims to evaluate the effectiveness of the RB & to understand the RB's characteristics of crash cushioning, how to correct the vehicle's running direction & the required strength of barriers. Experiments with barriers performance & crashing vehicle behavior at curved sections using a 1.3-ton passenger car & a 3.5-ton truck showed satisfactory vehicle behavior as they ran parallel with the RB after crashing. The structural problem of the RB wasn't found during the time of the crash. In the strength performance test using the 8-ton truck & in the passenger protection test using the 1.3-ton passenger car, the RB satisfied the Ministry of Construction & Transportation's " Guidelines for Installation & Management of Road Safety Facilities." The differences between the RB & conventional barriers where crash cushioning & required strength of barriers were involved were verified by mathematical equations. The RB can be effectively used in curved road sections, ramps, medians & entrance/exit ramps in parking garages.

Keywords: -accidents, longitudinal barrier, rolling barrier, traffic barrier, vehicle, collision.

I. INTRODUCTION

One Korean company developed a product to reduce the harsh impacts of guardrails & hopefully save lives. Every year approximately 1.25 million people die as a result of a road traffic crash. According to Federal Highway Administration, the guardrail can operate to deflect a vehicle back to the roadway, slow the vehicle down to a complete stop or let it proceed past the guardrail. The guardrail can't completely protect against the situations drivers may find themselves. To minimize the no. of accidents a company called ETI (Evolution in Traffic Innovation) designed " Rolling Barrier System".

II. FEATURES

- LED guide lamp (solar energy).
- Two Pieces.
- Material is eco-friendly.
- It reduces the speed of vehicle.
- Reduces costs in repairing & maintenance due to Roller's resilience.



- Made of special chemical compound like hard rubber.
- Easy to maintain due to separated barrels (recyclable).
- Stopper boards installed on the top and the lower part of the barrels to guide objects back to the road.
- Easy to adjust height, noticeable to drivers due to noticeable coloration and self-luminescence.
- Noticeable to drivers due to noticeable coloration and self-luminescence.

III. METHODOLOGY

SB5 crash test level:-

- ☐ Passenger safety performance-

1. Theoretical head impact velocity (THIV): 32.4km/hr (below 33km/hr)

2. Post impact head deceleration (THD): 9.9g's (below 20g's)

- ☐ Scatter prevention performance – No scatters of the fifty barriers.

- ☐ Test vehicle behavior performance – Not over thrown or a sudden stop after collision.

- ☐ 76.9% (Exit speed: 74.8km/hr): 43.7% (Exit angle: 8.74 degree)

- ☐ Synthetic results satisfied with criteria.

1. Small car :-900 kg car, 200 side collision. During the evaluation, it was observed that the ETI product sends an accident vehicle back to the normal moving track, protects occupants and second vehicle accidents.

2. Large Car :-10-ton truck, 150 side collision. During the evaluation, it was observed that the ETI product changes the collision method to rotational friction to make collision continue for a long time and thus minimize momentary shock.

3. Bus :- 13-ton bus, 200 side collision. During the evaluation, it was observed that the ETI product changes the collision method to rotational friction to make collision continue for a long time and minimize momentary shock.

IV. HOW DOES IT WORK?

- The rolling barriers do more than absorb impact energy. They convert impact energy into rotational energy to propel the vehicle forward rather than potentially breaking through an immovable barrier.
- The ETI product has a rotating barrel made of EVA with excellent shock absorption power, 3D buffering frames & dense props supporting the frames. Rotating Barrels comes with attached reflective sheeting for good visibility.
- EVA has a better flexibility & elasticity compared to other polyethylene resins & has most similar features to rubber. In fact, its lighter than rubber & most elastic than urethane. In shorts, it's not easily damaged.
- When a car hits the guardrail, the rotating barrel converts shock from the vehicle to rotational energy. Upper & lower frames adjust tires of large & small vehicles to prevent the steering system from a functional loss.
- Railways rails & liquid props absorb shock from accidents vehicles & frames with the smooth surface adjust tires of the vehicles & guide them in the moving direction to prevent second rear – end collisions. The 3D structure of the D – shaped frame & buffering bracket distribute & absorb the second shock.



- Props at an interval of 0.7 m increase bearing power to prevent vehicles from further derailing. As the props are independent only damaged parts need to be replaced. This keeps maintenance costs pretty low.

V. CONCLUSION

The accidents are the errors which are occurred or done by humans while on the usage of motor vehicles and also sometimes the nature creates problems like rainy and cold weather conditions for slippery surfaces of roads, which will create chaos situations and tends to hit the other vehicles or hit the barriers installed on the outer edge of the roads. These barriers are of different types and have their own characteristic features but the new idea is about the installations of the rolling barrier systems which will stop the accidents occurring to surpass the road to gravel or steep hill down or other part of the road, and also saves life of the people present inside the vehicle. As above explanations of barriers and their proofs tells us that the rolling barrier systems are a high priority towards safety, better than other types of barriers in terms of stiffness and strength, high positive results in the crash test performances, etc. Ultimately life is more precious than vehicles but when it comes to rolling barrier system usage, it safes life and also prevents maximum damage level of the vehicles. The rolling barrier systems are the future technology in Transportation Engineering.

VI. ACKNOWLEDGEMENTS

The authors sincerely acknowledge under the guidance of Mr. D. O. Bhavar (H.O.D. of Civil Dept. in GGSCOERC), Prof. Mrs. T. A. Kulkarni, Prof. Miss. P.S.Bhamre.

REFERENCES

- [1]. <https://www.autofreaks.com/news/malaysia-installs-safety-rolling-barriers-along-high-risk-roads/Malaysia Installs Safety Rolling Barriers Along High-Risk Roads!>
- [2]. [Search.proquest.com/openview/a4a9e83a3905f8f3bb92d5/1.pdf?_origsite=gscholar&cbl=1496355A](http://search.proquest.com/openview/a4a9e83a3905f8f3bb92d5/1.pdf?_origsite=gscholar&cbl=1496355A) study on the characteristics of rolling barriers
- [3]. [Pibphoto.nic.in/documents/rink/2016/jun/p20166905.pdf](http://pibphoto.nic.in/documents/rink/2016/jun/p20166905.pdf) Road accidents in India 2015
- [4]. http://en.wikipedia.org/wiki/traffic_barriers
- [5]. www.ks0486.com/wp/product/highway-roller-barrier-systems/
- [6]. www.mearthane.com/about-urethane/
- [7]. www.ji-tech.kr/wp/product/safety-rolling-barrier/
- [8]. <http://m.indiatimes.com/culture/travel/15-dangerous-roads-in-india-that-are-a-driver%E2%80%99s-worst-nightmare-245762.html> 16 Dangerous Roads in India That Are a Driver's Worst Nightmare

BOOKS :-

- Highway Engineering – Laurence I Hewes & Clarkson H Oglwsby
- Traffic Engineering & Transport Planning – L R Kadiyali
- Introduction to transport planning – M. J. Bruton.